LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A noise compensation system comprising:

a variable amplifier configured to receive an audio input signal and to generate an audio output signal in response to the audio input signal;

where the variable amplifier is further configured to receive an adjustment signal and to control an output level of the audio output signal in response to the adjustment signal;

a source sound processor coupled to the variable amplifier, configured to receive the audio output signal, and configured to generate a set of audio output levels, where each audio output level from the set of audio output levels is indicative of the audio output signal in a corresponding frequency band from a set of frequency bands;

an area sound processor configured to receive an ambient sound input signal and configured to generate a set of ambient sound levels, where each ambient sound level from the set of ambient sound levels is derived from the ambient sound input signal in a corresponding frequency band from the set of frequency bands; and

an adjustment circuit coupled to the source and area sound processors, configured to perform a comparison of the set of audio output levels with the set of ambient sound levels, and configured to generate the adjustment signal in response to the comparison.

2. (Original) The noise compensation system of claim 1, where:

the source sound processor is configured to generate the set of audio output levels as logarithmic indicators of audio output in the set of frequency bands; and

the area sound processor is configured to generate the set of ambient sound levels as logarithmic indicators of ambient sound in the set of frequency bands.

3. (Original) The noise compensation system of claim 1, where:

the source sound processor is configured to generate the set of audio output levels in units of dB; and

the area sound processor is configured to generate the set of ambient sound levels in units of dB.

4. (Original) The noise compensation system of claim 1, where:

the adjustment circuit performs the comparison by subtracting the set of audio output levels from the set of ambient sound levels.

5. (Original) The noise compensation system of claim 1, where the set of frequency bands includes two or more frequency bands.

6. (Original) The noise compensation system of claim 1, where the set of frequency bands has two frequency bands.

7. (Original) The noise compensation system of claim 1, where the set of frequency bands has between three and fifty frequency bands.

8. (Original) The noise compensation system of claim 1, where the set of frequency bands has eight frequency bands.

9. (Original) The noise compensation system of claim 1, where the set of frequency bands includes:

a first frequency band from about 100 Hz to about 145 Hz;

a second frequency band from about 145 Hz to about 211 Hz;

a third frequency band from about 211 Hz to about 307 Hz;

a fourth frequency band from about 307 Hz to about 447Hz;

a fifth frequency band from about 447 Hz to about 650 Hz;

a sixth frequency band from about 650 Hz to about 944 Hz;

a seventh frequency band from about 944 Hz to about 1372 Hz;

and

an eighth frequency band and from about 1372 Hz to about 2000 Hz.

10. (Original) The noise compensation system of claim 1, where the set of frequency bands includes substantially nonoverlapping frequency bands.

11. (Original) The noise compensation system of claim 1, where the set of frequency bands includes partially overlapping frequency bands.

12. (Original) The noise compensation system of claim 1, where the set of frequency bands altogether span a continuous frequency range including from about 100 Hz to about 2000 Hz.

13. (Original) The noise compensation system of claim 1, where the set of frequency bands altogether span non-contiguous portions of the frequency range from about 100 Hz to about 2000 Hz.

14. (Original) The noise compensation system of claim 1, where the source sound processor includes:

a filter bank with bandpass filters for the set of frequency bands, configured to split the audio output signal into a set of bandpass signals;

a running-average block coupled to the filter bank and configured to calculate a set of running averages of absolute values for the set of bandpass signals;

a logarithm block coupled to the running-average block and configured to generate the set of audio output levels by performing substantially logarithmic conversions on the set of running averages.

15. (Original) The noise compensation system of claim 1, further comprising:

a memory capable of storing listening-area characteristics;

where the area sound processor is further configured to derive the set of ambient sound levels from the ambient sound input signal in response to the stored listening-area characteristics.

16. (Original) The noise compensation system of claim 15, where the listening-area characteristics include:

information regarding a substantially constant-level background noise in the listening area, and

information regarding an acoustic response of the listening-area.

17. (Original) The noise compensation system of claim 1, where the area sound processor includes:

a memory;

a filter bank with bandpass filters for the set of frequency bands, configured to split the ambient sound input signal into a set of bandpass signals;

a running-average block coupled to the filter bank and configured to calculate a set of running averages of absolute values for the set of bandpass signals;

a gain stage coupled to the memory and to the running-average block and configured to separately scale each running average in the set of running averages in response to information stored in the memory;

a background removal stage coupled to the memory and to the running-average block and configured to separately offset each running average in the set of running averages in response to information stored in the memory; and

a logarithm block coupled to the running-average block and configured to generate the set of ambient sound levels by performing substantially logarithmic conversions on the set of running averages.

18. (Original) The noise compensation system of claim 17, where the memory stores characteristics of a listening-area including:

information regarding a substantially constant-level background noise in the listening area, and

information regarding an acoustic response of the listening area;

where the gain stage is configured to separately scale each running average in the set of running averages in response to the information regarding the acoustic response of the listening area; and

where the background removal stage is configured to separately offset each running average in the set of running averages in response to the information regarding the substantially constant-level background noise in the listening area.

19. (Original) The noise compensation system of claim 17, where the running- average block integrates the absolute values for the set of bandpass signals over a time constant of approximately 30 seconds.

20. (Original) The noise compensation system of claim 17, where the running- average block integrates peak values from the set of bandpass signals over a time constant of approximately 30 seconds.

21. (Original) The noise compensation system of claim 17, where the running- average block integrates peak absolute values from the set of bandpass signals over a time constant of approximately 30 seconds.

22. (Original) The noise compensation system of claim 1, where the set of audio output levels and the set of ambient sound levels are logarithmic representations of signal levels, and where the adjustment circuit includes:

a difference circuit coupled to the source sound processor and to the area sound processor and configured to calculate a set of arithmetic differences between the set of audio output levels and the set of ambient sound levels, and

a combiner circuit coupled to the difference circuit and configured to combine each of the arithmetic differences from the set of arithmetic differences to generate the adjustment signal.

23. (Original) The noise compensation system of claim 22, where the combiner circuit adds together the arithmetic differences from the set of arithmetic differences to generate the adjustment signal.

24. (Original) The noise compensation system of claim 22, where the combiner circuit adds together a function of the arithmetic differences from the set of arithmetic differences to generate the adjustment signal.

25. (Original) The noise compensation system of claim 1, where the adjustment circuit is configured to generate the adjustment signal in response to the comparison and with independent weights assigned to each of the frequency bands in the set of frequency bands.

26. (Original) The noise compensation system of claim 1, where the adjustment circuit includes:

a comparator coupled to the source sound processor and to the area sound processor and configured to calculate a set of comparison values from the set of audio output levels and the set of ambient sound levels;

a memory storing a set of weighting values for the set of frequency bands;

a scaling circuit coupled to the comparator and to the memory, and configured to scale each of the comparison values in the set of comparison values by a corresponding weighting value from the set of weighting values; and

a combiner circuit coupled to the scaling circuit and configured to combine the scaled comparison values to generate the adjustment signal.

27. (Original) The noise compensation circuit of claim 26, where:

the comparator is a difference block configured to calculate a set of differences between the set of audio output levels and the set of ambient sound levels; and

the combiner circuit is a summer configured to arithmetically add the scaled comparison values to generate the adjustment signal.

28. (Original) The noise compensation system of claim 1, where the adjustment circuit receives a max boost setting and limits values of the adjustment signal in response to the max boost setting.

29. (Original) The noise compensation system of claim 1, where the adjustment circuit receives a sensitivity setting and generates the adjustment signal in response to the sensitivity setting.

30. (Original) The noise compensation system of claim 29, where the sensitivity setting indicates a desired overall difference between the set of audio output levels and the set of ambient sound levels.

31. (Original) The noise compensation system of claim 29, where the sensitivity setting indicates a desired overall difference in level between desired sounds and ambient sounds in a listening area.

32. (Original) The noise compensation system of claim 29, where the adjustment signal includes an attenuation signal, and where the adjustment circuit includes:

a first subtraction block configured to receive a comparison signal indicative of the comparison of the set of audio output levels with the set of ambient sound levels, configured to receive the sensitivity setting, and configured to calculate an error signal indicative of the difference between the comparison signal and the sensitivity setting;

an integrator coupled to the subtraction block and configured to integrate the error signal in time to generate a preliminary adjustment signal;

a second subtraction block coupled to the integrator, configured to receive a makeup gain defeat signal, and configured to subtract the makeup gain defeat signal from the preliminary adjustment signal to generate the attenuation signal.

33. (Original) The noise compensation system of claim 1, where variable amplifier includes a stereo voltage-controlled amplifier (VCA) and a makeup amplifier, and where the adjustment signal includes an attenuation signal and it max boost setting;

where the stereo VCA attenuates the audio input signal in response to the attenuation signal;

where the makeup amplifier is coupled to the stereo VCA; and

where the makeup amplifier generates the audio output signal by amplifying the attenuated audio input signal as determined by the max boost setting.

34. (Original) A method of compensating for noise in a listening area, comprising:

receiving an audio input signal;

scaling the audio input signal according to an adjustment signal to generate an audio output signal;

receiving an ambient sound input signal;

calculating a set of audio output levels, where each audio output level from the set of audio output levels is indicative of the audio input signal in a corresponding frequency band from a set of frequency bands;

calculating a set of ambient sound levels, where each ambient sound level from the set of ambient sound levels is derived from the ambient sound input signal in a corresponding frequency band from the set of frequency bands;

comparing the set of audio output levels and the set of ambient sound levels; and

generating the adjustment signal in response to the comparing.

35. (Original) The method of claim 34, where:

the calculating the set of audio output levels includes calculating logarithmic indicators of audio output in the set of frequency bands; and

the calculating a set of ambient sound levels includes calculating logarithmic indicators of ambient sound in the set of frequency bands.

36. (Original) The method of claim 34, where:

the comparing includes subtracting the set of audio output levels from the set of ambient sound levels.

37. (Original) The method of claim 34, where the set of frequency bands includes:

a first frequency band from about 100 Hz to about 145 Hz;

a second frequency band from about 145 Hz to about 211 Hz;

a third frequency band from about 211 Hz to about 307 Hz;

a fourth frequency band from about 307 Hz to about 447 Hz;

a fifth frequency band from about 447 Hz to about 650 Hz;

a sixth frequency band from about 650 Hz to about 944 Hz;

a seventh frequency band from about 944 Hz to about 1372 Hz; and

an eighth frequency band and from about 1372 Hz to about 2000 Hz.

38. (Original) The method of claim 34, where the set of frequency bands includes substantially nonoverlapping frequency bands.

39. (Original) The method of claim 34, where the set of frequency bands includes substantially noncontiguous frequency bands.

40. (Original) The method of claim 34, further comprising:

storing listening-area characteristics; and

where the calculating a set of ambient sound levels is performed in response to the stored listening area characteristics.

41. (Original) The method of claim 40, where the listening area characteristics include:

information regarding a substantially constant-level background noise in the listening area, and

information regarding an acoustic response of the listening area.

42. (Original) The method of claim 40, further comprising:

offsetting the ambient sound levels in response to the information regarding the substantially constant-level background noise in the listening area; and

scaling the ambient sound levels in response to the information regarding the acoustic response of the listening area.

43. (Original) The method of claim 34, further comprising:

integrating the ambient sound levels over a time constant of approximately 30 seconds.

44. (Original) The method of claim 34, where the generating the adjustment signal is performed with independent weights assigned to each of the frequency bands in the set of frequency bands.

45. (Original) The method of claim 34, further comprising:

limiting values of the adjustment signal in response to a max boost setting.

46. (Original) The method of claim 34, where the generating the adjustment signal is performed in response to a sensitivity setting.

47. – 65. (Cancelled)